

Integrated Observations: Regional Status and Applications in Coastal Ecosystems

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Overview

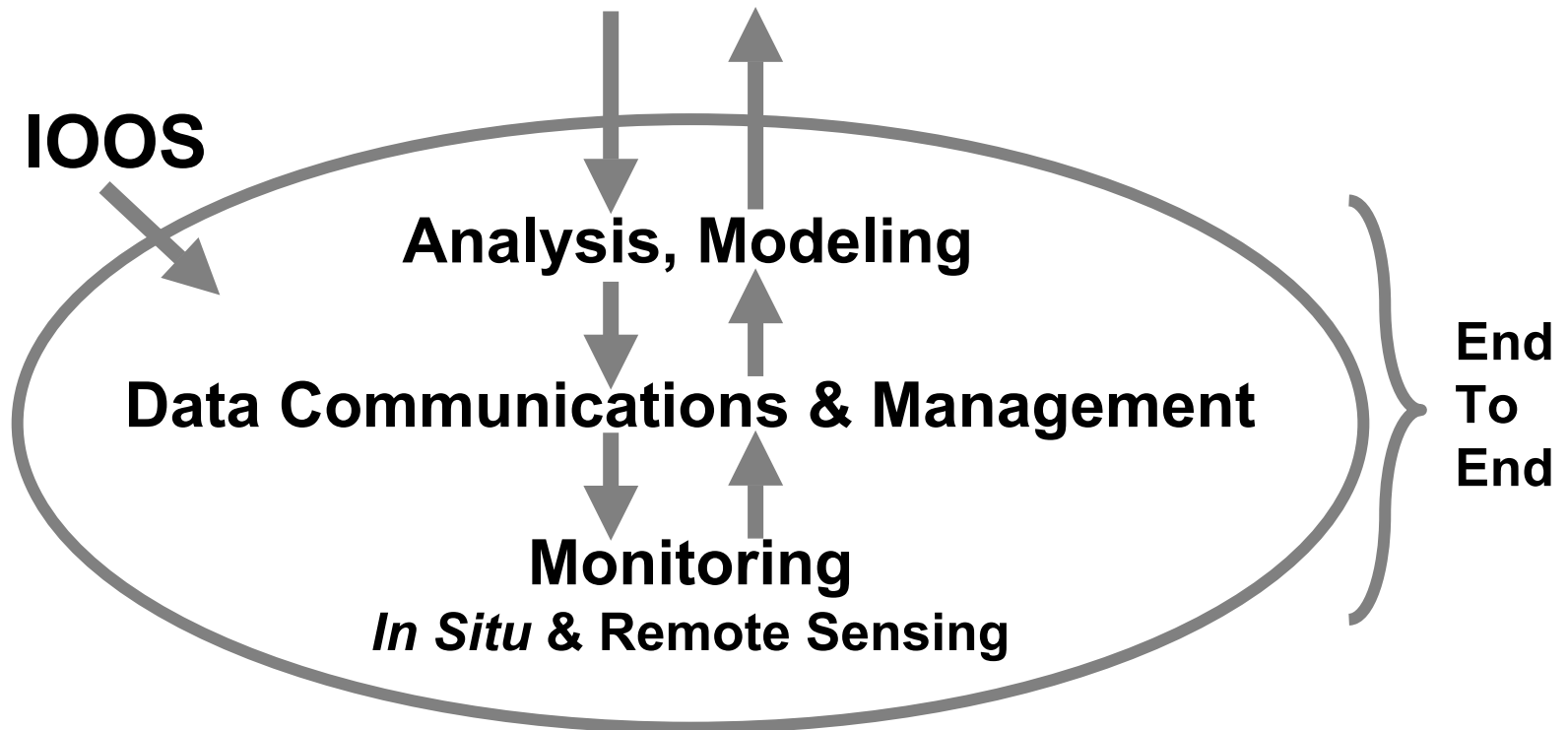
- **Regional Status**
- **Drivers**
- **Applications**



Regional Status

IOOS Vision

- Sustained System
- Consistently Provides Data & Information
- Specified by Multiple User Groups



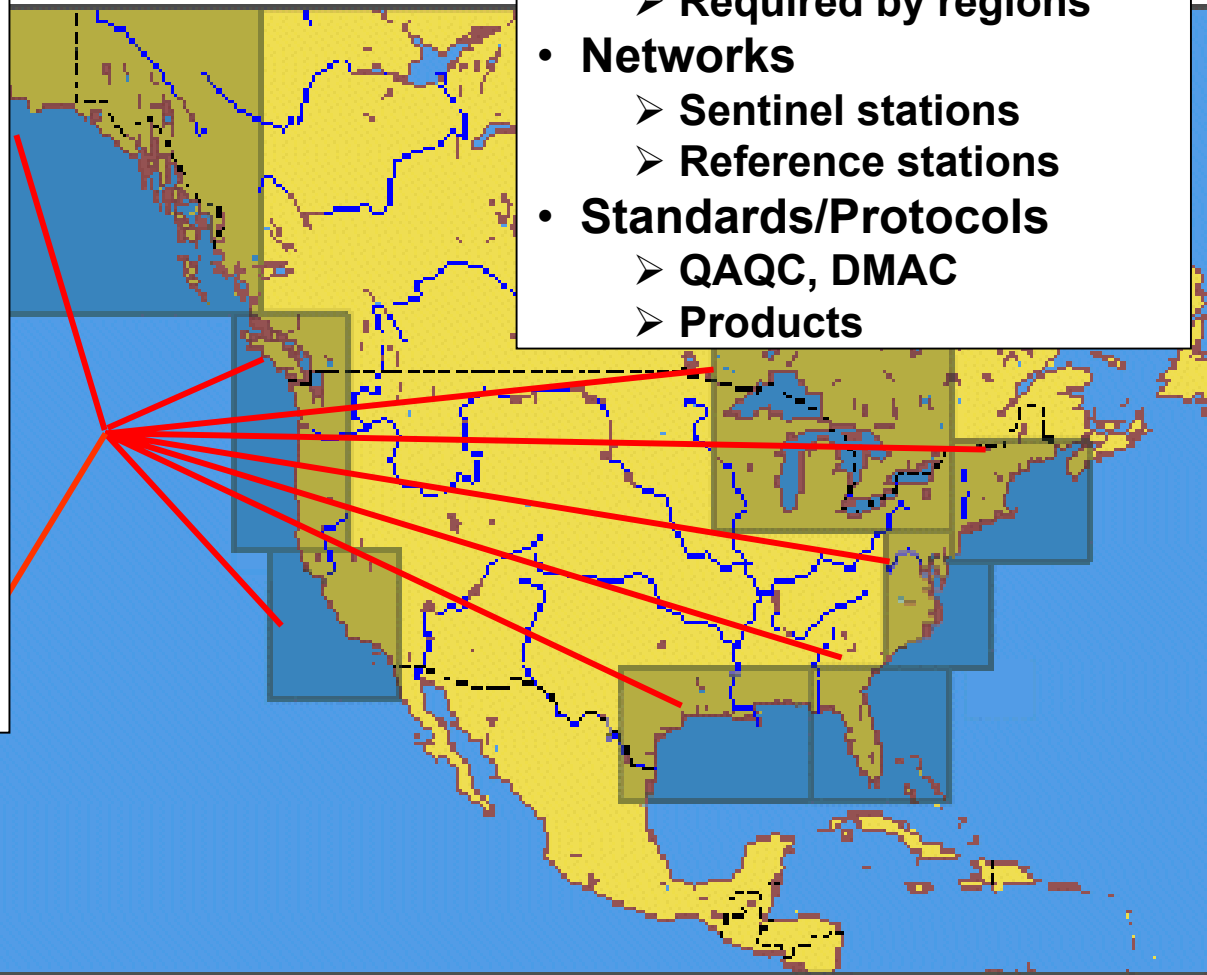
Coastal and Great Lakes Components

Regional Systems

- **Regional Associations**
 - Design
 - Operate
- **Involve user groups**
 - Design
 - Evaluation
- **Incorporate**
 - Subregional systems
 - Elements thereof
- **Based on User Needs**
 - ↑ Resolution
 - ↑ Variables

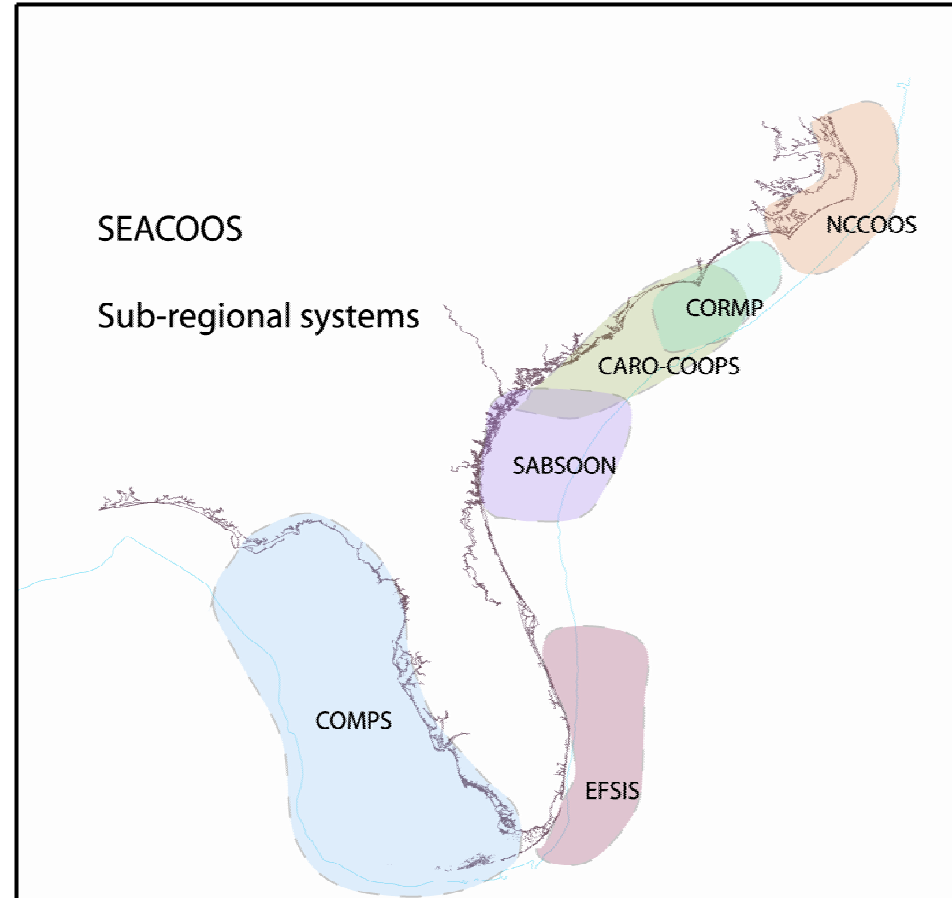
National Backbone

- **Operated by**
 - NOPP Agencies
 - Regional Associations
- **EEZ & Great Lakes**
- **Core variables**
 - Required by regions
- **Networks**
 - Sentinel stations
 - Reference stations
- **Standards/Protocols**
 - QAQC, DMAC
 - Products

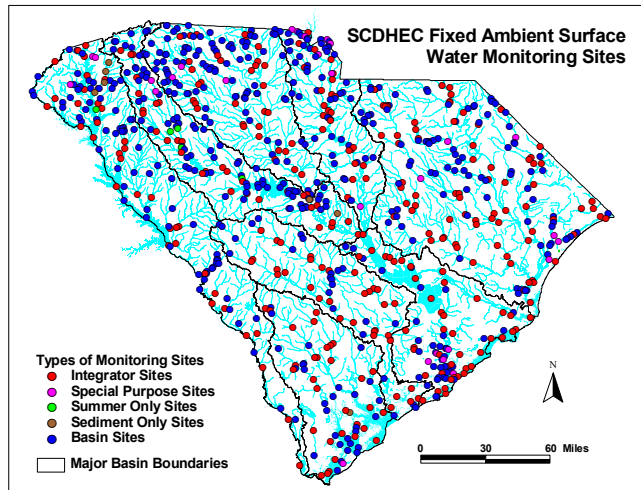


Regional Coastal Ocean Observing Systems (RCOOS)

- The integrated assemblage of observing elements within a region
- Structured to implement the observing priorities of the Regional Association

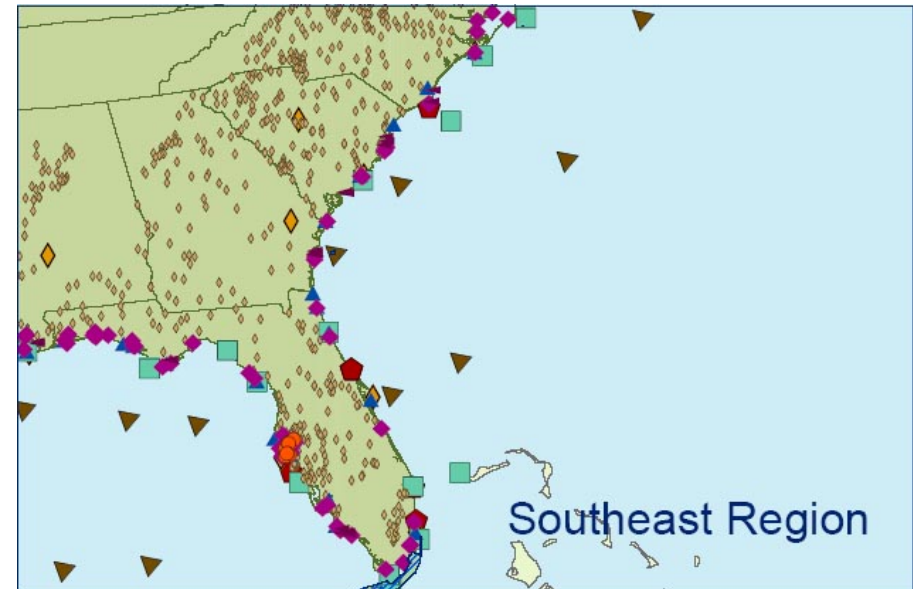
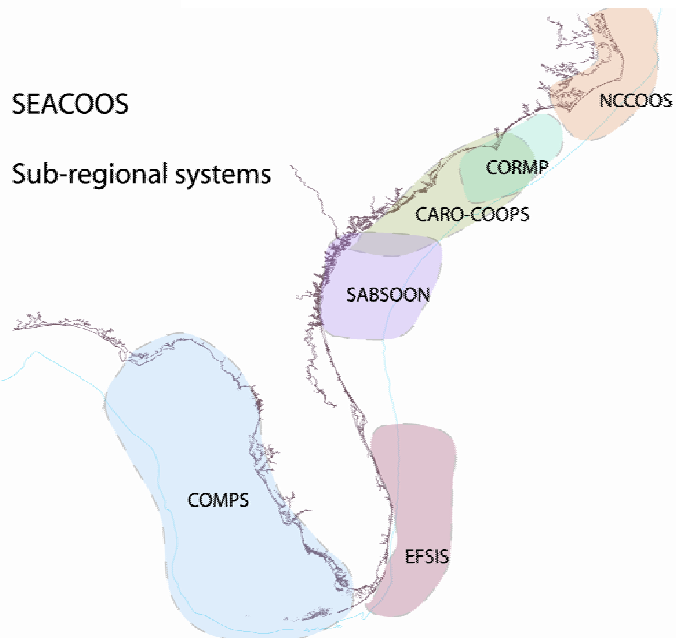


Enhanced Integration



SEACOOS

Sub-regional systems



Legend

- National Data Buoy Center Moored Weather Buoys
- Physical Oceanographic Real Time System
- National Estuarine Research Reserves
- National Status & Trends - Mussel Watch
- National Water Level Observation Network
- National Data Buoy Center C-MAN Stations
- Continuously Operating Reference Stations
- National Marine Sanctuaries
- US Geological Survey Stream Gauge Network
- Corps of Engineers Wave Gauges

Coastal Observation Technology System (COTS)

Designed to further the development of integrated coastal ocean observing systems on a regional basis. COTS projects target two critical elements of developing regional capacity for coastal/ocean observations:

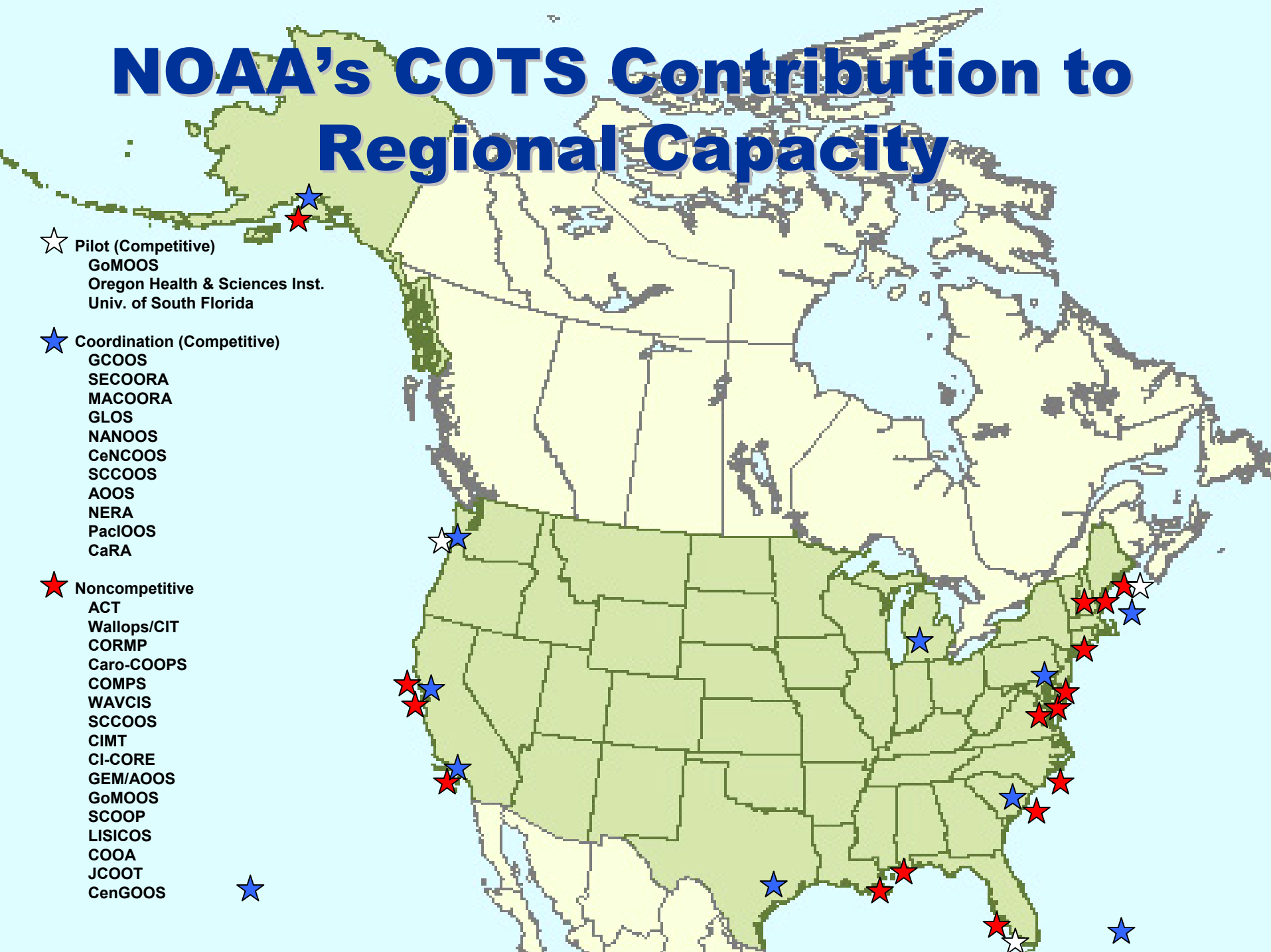
- **Creating infrastructure (e.g., sensors, data management systems) and methodologies to collect, share, and integrate environmental data and create useful information products**
- **Developing organizational and governance structures for regional associations as components of the IOOS**

NOAA's COTS Contribution to Regional Capacity

☆ Pilot (Competitive)
GoMOOS
Oregon Health & Sciences Inst.
Univ. of South Florida

★ Coordination (Competitive)
GCOOS
SECOORA
MACOORA
GLOS
NANOOS
CeNCOOS
SCCOOS
AOOS
NERA
PacIOOS
CaRA

★ Noncompetitive
ACT
Wallops/CIT
CORMP
Caro-COOPS
COMPS
WAVCIS
SCCOOS
CIMT
CI-CORE
GEM/AOOS
GoMOOS
SCOOP
LISICOS
COOA
JCOOT
CenGOOS



Drivers

User-Driven Initiative: Getting from Data to Decisions

How do we go from data observations to informed science, management, business, and other decisions?

- **Know what we need . . . priority issues – *this is the most important step – what are the requirements?***
- **Know what we have . . . current assets**
- **Fill in the gaps . . .**
- **Effectively and efficiently integrate data streams**
- **Develop information products and decision-support tools that include these data streams**

CZM Requirements and IOOS

From survey of US coastal managers

Management Issues

- Land use
- Habitat change
- Environmental contamination
- Sediment management
- Nutrient enrichment
- Nonindigenous species
- Coastal hazards
- Ocean management
- Marine debris

Observations Needed

- Aerial and satellite imagery
- Sea level
- Dissolved oxygen
- Dissolved inorganic nutrients
- Phytoplankton species
- Organic matter
- Bathymetry/bottom type
- Currents
- Waves
- Zooplankton species
- Light penetration
- Winds

IOOS Coastal Component Priorities*

Develop an integrated approach to monitoring environmental quality (pelagic and benthic environments) and for assessing living resources (ecosystem-based management) to provide . . .

- 1. Surface and interior fields of dissolved inorganic nutrients, oxygen, chlorophyll-*a*, and macrozooplankton abundance**
- 2. Extent and condition of benthic habitats**
- 3. Abundance and distribution of LMRs (including protected species)**
- 4. Land-sea freshwater flows and associated fluxes of sediments, nutrients, and contaminants**

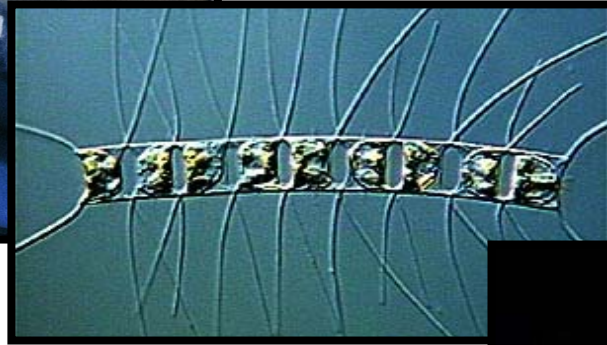
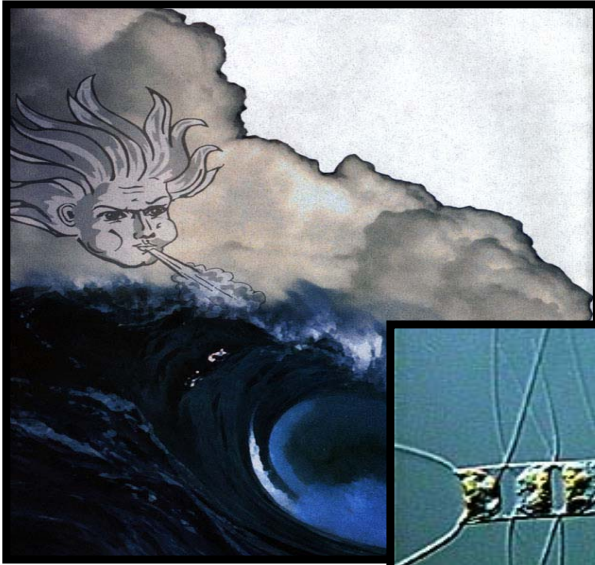
*** From 1st Annual IOOS Development Plan**

Applications

Center for Integrated Marine Technologies



From Wind to Whales



*Trophic links in
the California coastal
upwelling region*

Harmful Algal Bloom Bulletin

- Notice of changing conditions
- Available within e-mail to coastal managers

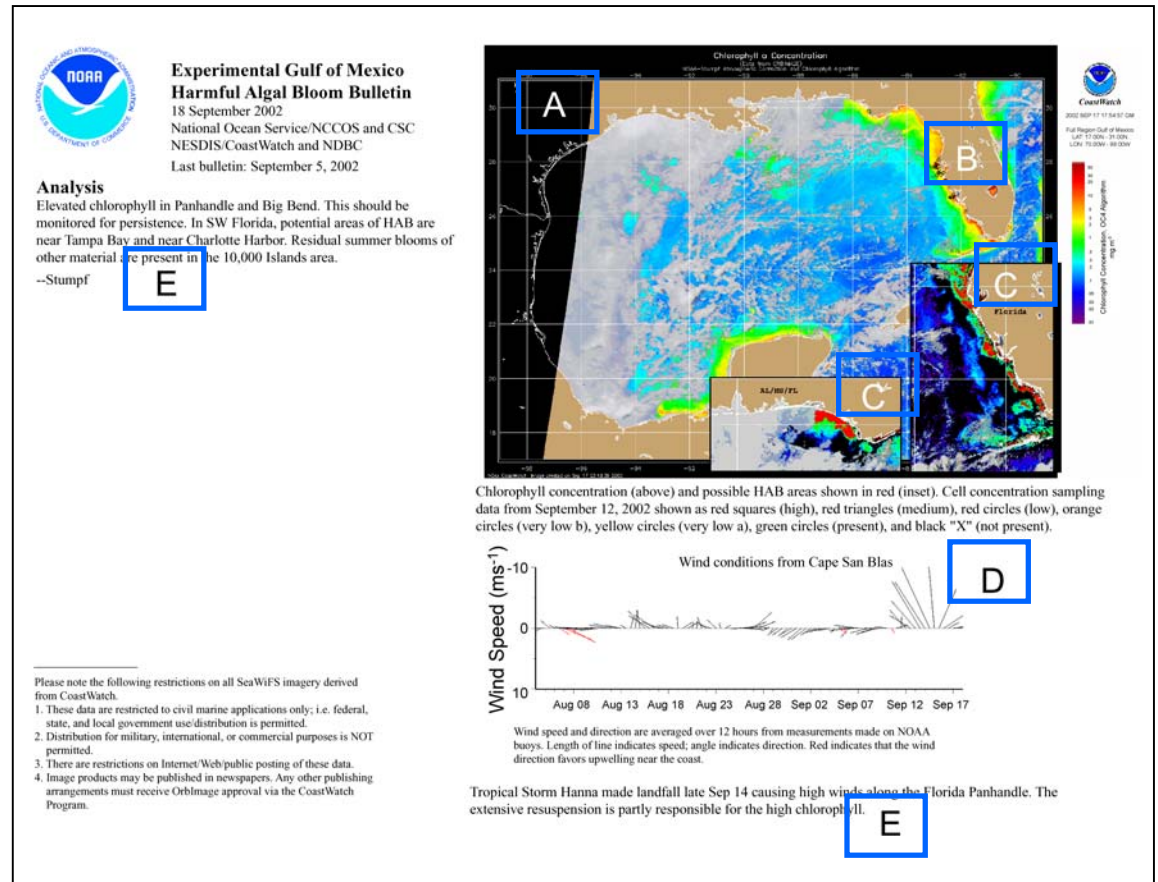
**A – SeaWiFS
chlorophyll image**

B – Last known position

C – Areas affected

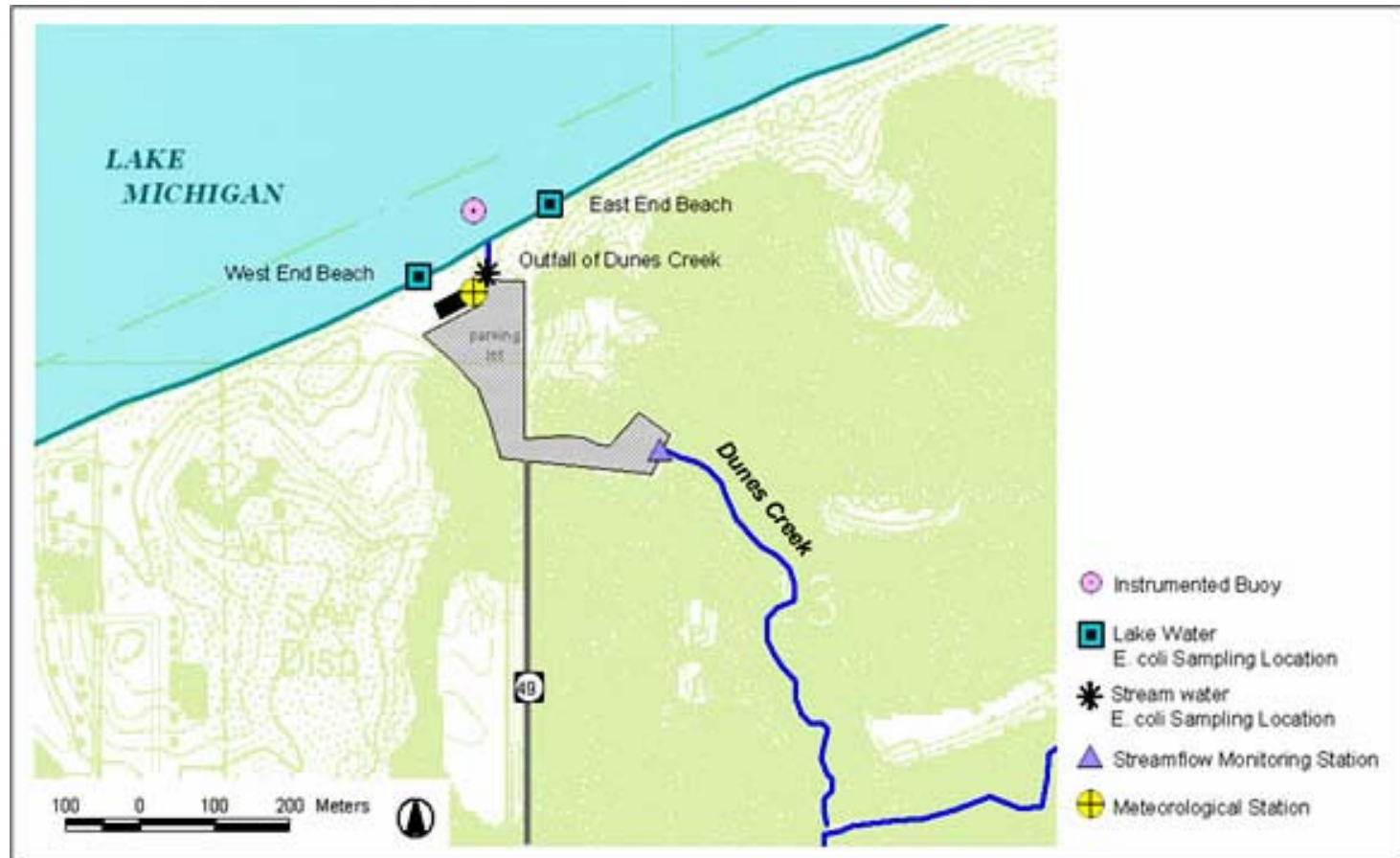
D – Local winds

E – Data interpretation



NOAA Ctr. for Operational Oceanographic Products and Services
NOAA Ctr. for Coastal Ocean Science
NOAA CoastWatch
NOAA Coastal Services Ctr.

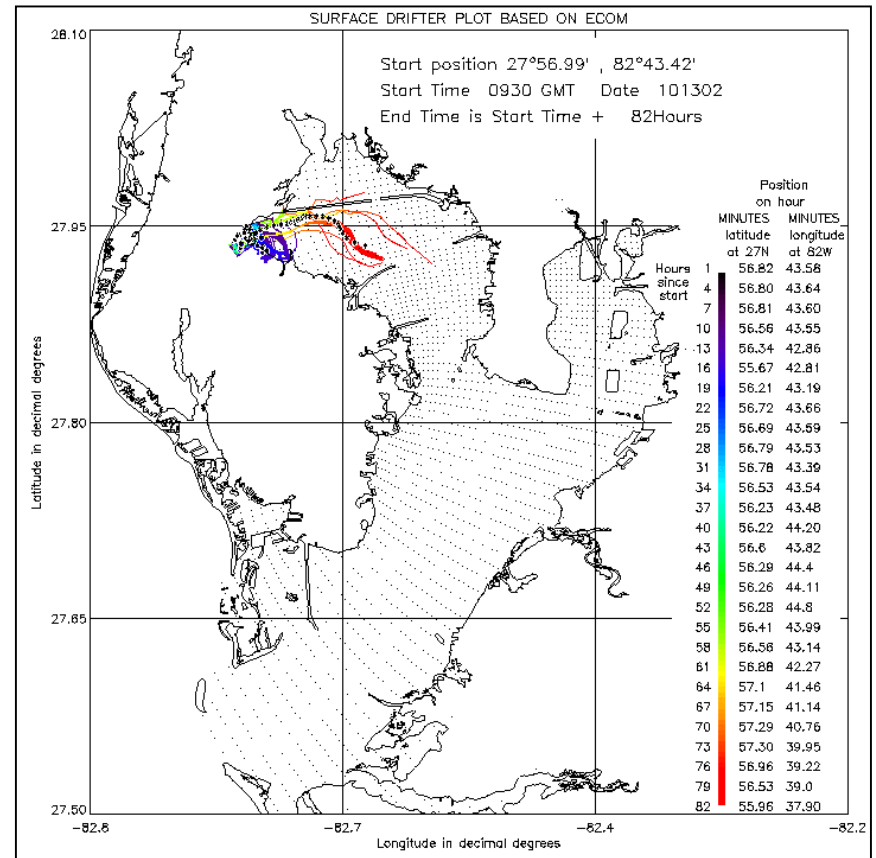
SwimCast: High Tech Monitoring of Illinois Beaches



Location map showing instrumentation and sampling locations on Dunes Creek Beach, East End Beach, and West End Beach (IL)

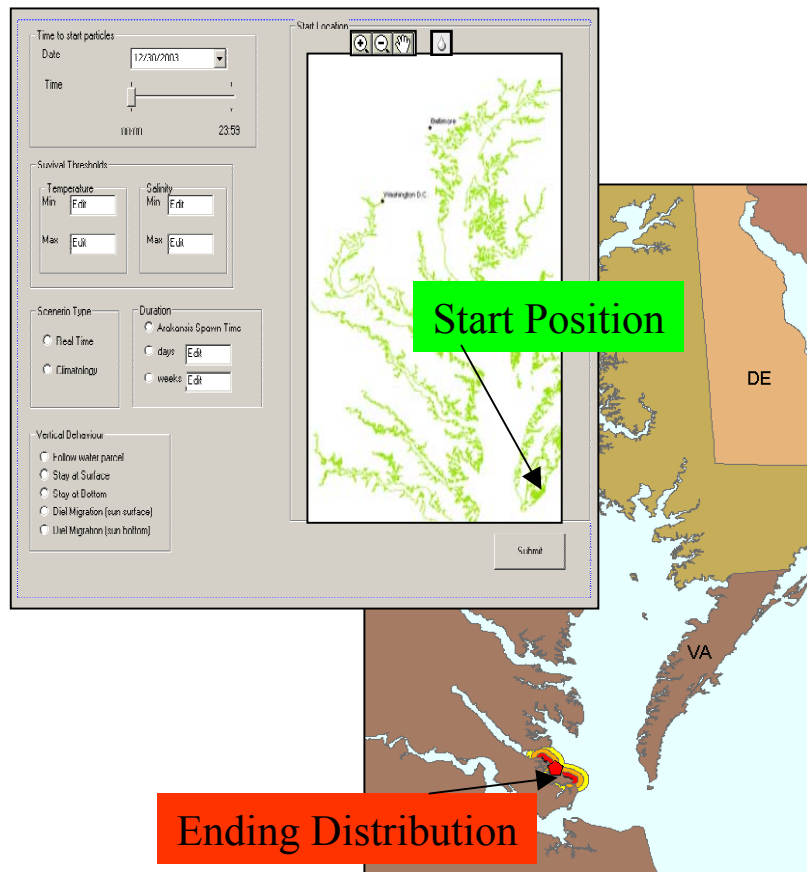
Contaminant Spills

- **Sewage overflow in Tampa Bay**
- **County Department of Health asked for spill trajectory**
- **Observations + model run identified potential impact**
- **Identified areas shut down for clean up**



NOS Partnership Coastal Observation Demo Project

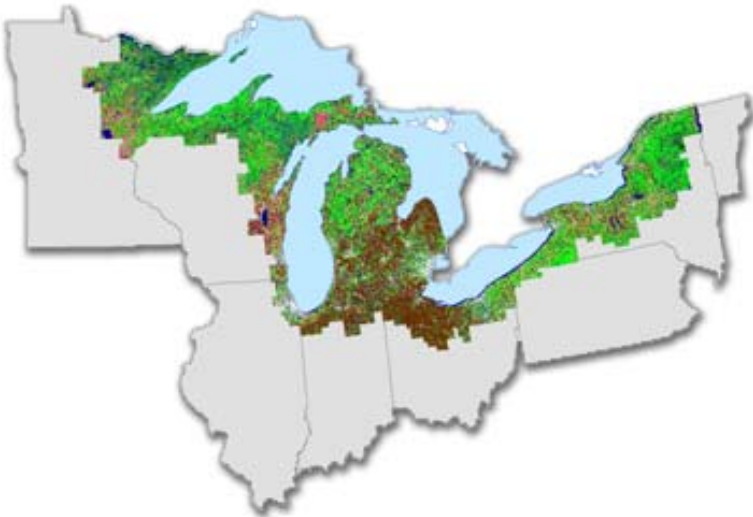
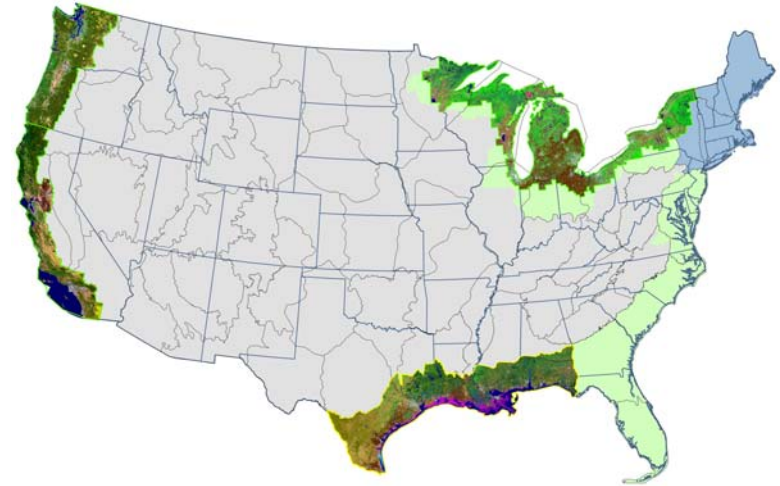
Chesapeake Bay Oyster Larvae Tracking (CBOLT)



- NOS working with NOAA Chesapeake Bay Office and other local partners
- Requirements process: siting questions regarding exotic oysters
- Enhanced observations (NOAA and academic)
- Data drives 3-D hydrodynamic model
- User inputs parameters
- Tool delivers map of larval distribution
- User makes decision (MD, VA, and DE fish and coastal management agencies, NERRs)

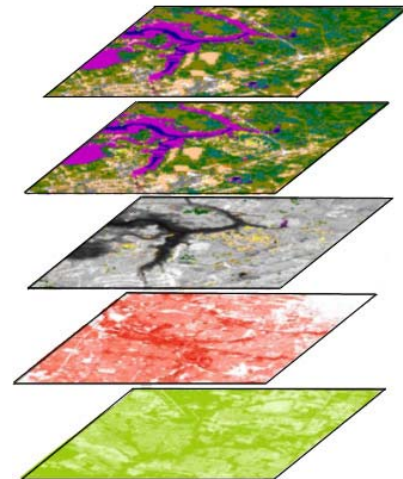
Coastal Change Analysis Program

- **Standardized, accessible inputs**
 - Based on 30 meter Landsat imagery
- **Innovative, repeatable procedures**
 - Accompanied by FGDC metadata
- **Consistent national coverage**
 - Coastal stewards of the National Land Cover Database (NLCD)
- **Relevant, accurate products**
 - 85% overall target accuracy



Land cover products in the Great Lakes:

- Land cover circa 2001
- Land cover circa 1996
- Change data (1996 to 2001)
- Percent impervious surface
- Percent canopy surface

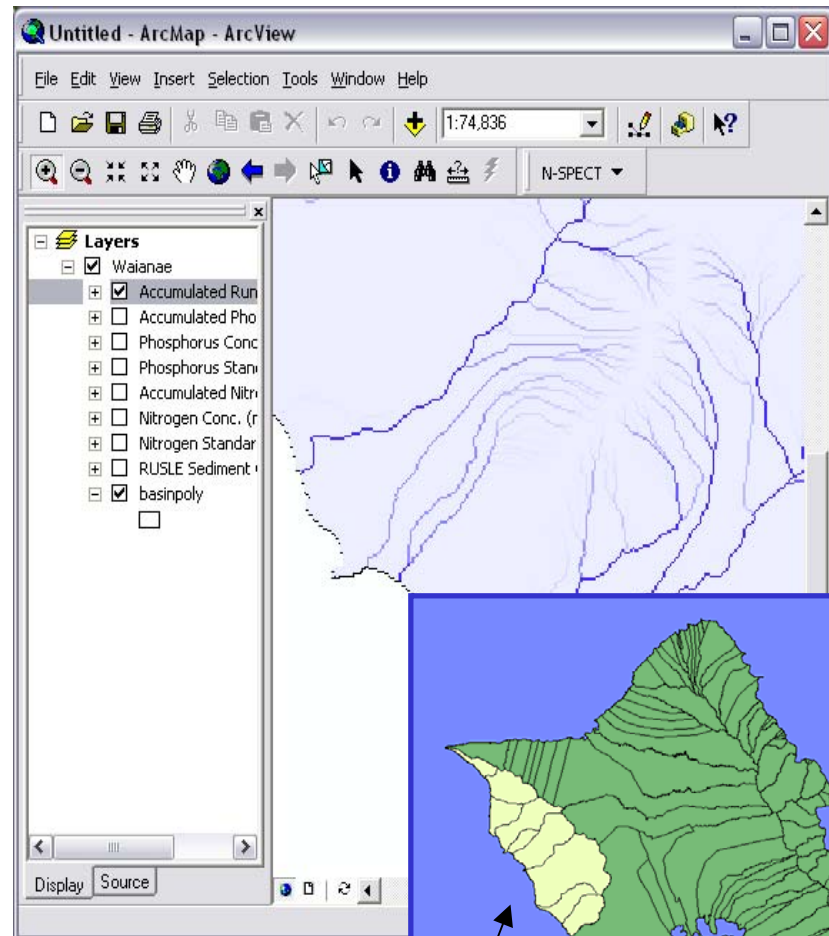


Pollution and Erosion

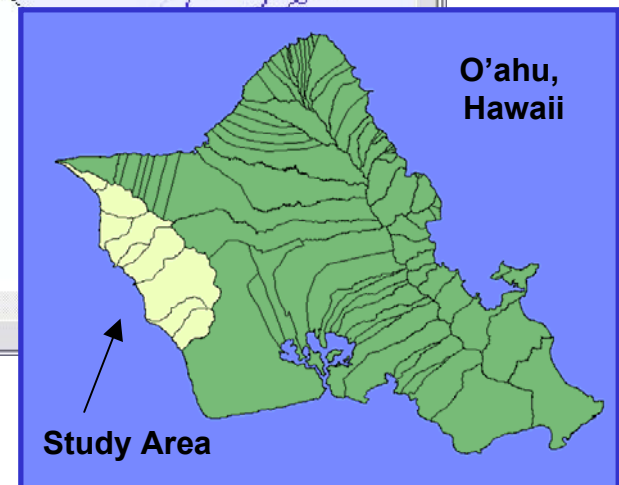
Decision Support

Nonpoint-Source Pollution and Erosion Comparison Tool (N-SPECT)

- Examines the relationship between land cover, nonpoint source pollution, erosion, and water quality
- ArcGIS extension
- Partner-identified needs:
 1. Estimate runoff
 - Where
 - How much
 2. Non-point pollution
 3. Erosion/sediments
- First deployment in Oahu, Hawaii

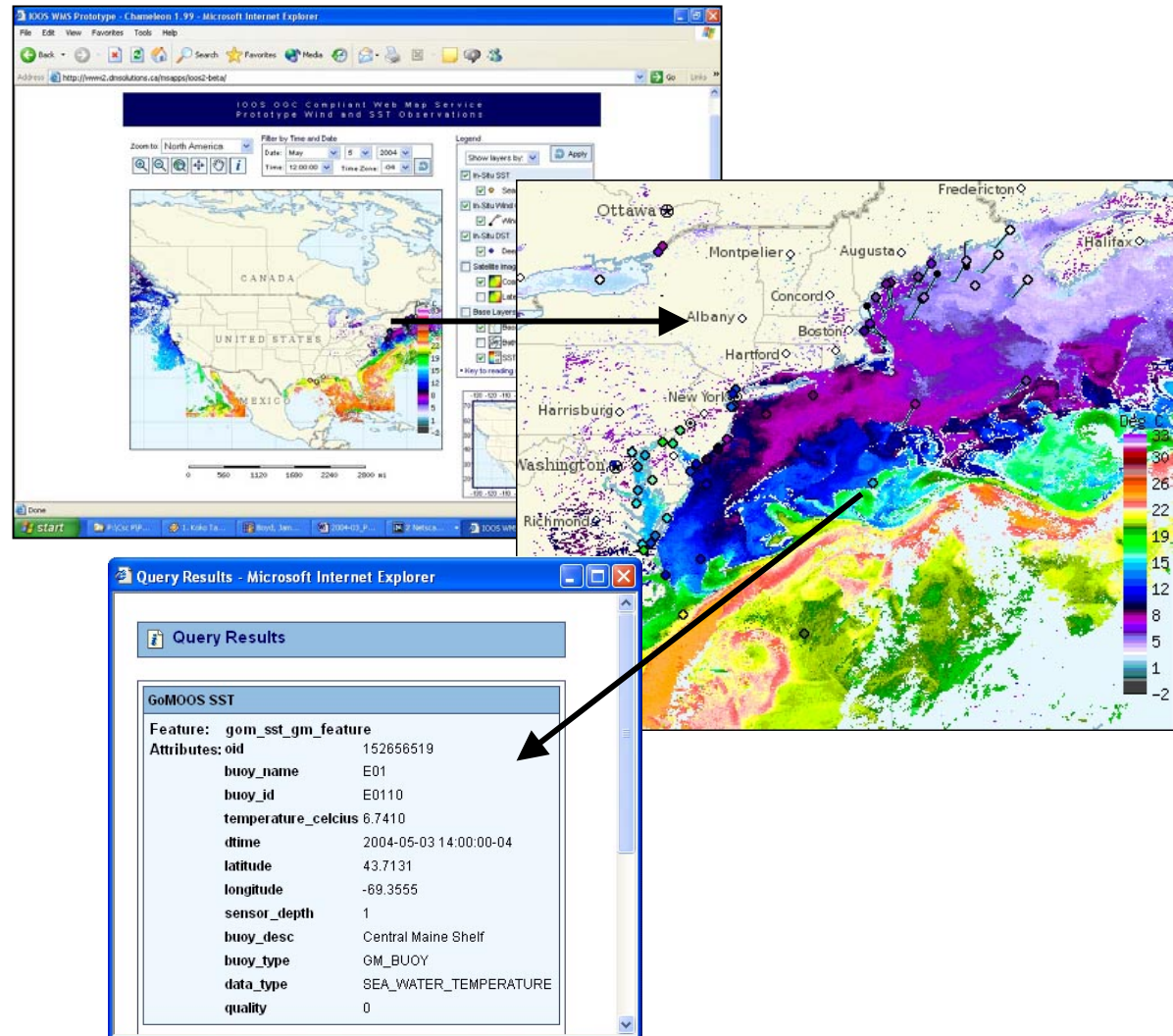


Accumulated runoff



OpenI0OS Interoperability Test Bed (www.dev.openI0OS.org)

- Platform for testing coastal ocean observing systems data integration and interoperability
- Standards development and testing
- National data integration
- Regional applications



Seven IOOS Themes

- **Predict climate change and effects**
- **Mitigate natural hazards**
- **Improve coastal waters operations**
- **Improve national security**
- **Reduce public health risks**
- **Protect ecosystems**
- **Sustain marine and freshwater resources**



Value

- **Acquire and disseminate data and information on past, present, and future states of oceans, coasts, and Great Lakes**
- **Integrate existing monitoring programs**
- **Enhance observations**
- **Increase data access**
- **Coordinate regionally, nationally, and globally**
- **Develop useful information products for society**